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Proceedings of the Fisheries Management Studies Working Group

23-25 February 1998

Gulf Fisheries Centre
Moncton, New Brunswick

R.G. Halliday, Chairman

June 1998

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Abstract

The Fisheries Management Studies Working Group meeting, held 23-25 February 1998, at the Gulf Fisheries Centre in Moncton, New Brunswick, reviewed two Integrated Fisheries Management Plans and made recommendations for revision to the template for the structure and content of plans, and for adoption of a list of questions to be used in future plan evaluations. A method for detecting discarding of small fish by comparing at-sea length-frequency observations of catches with length frequencies of landings at dockside was reviewed and a pilot experiment was recommended. A review of the Dockside Monitoring Programme (DMP) for landed quantities indicated that improvements to the programme itself were already underway but it was recommended that problems external to the programme, such as the possibilities of boats partially or completely bypassing the DMP and of collusion between vessel captain and monitor, should be investigated. Analyses of trends in observer and port sampling, and comparisons with National Sea Products Ltd. port samples and enforcement sea samples, were also reviewed, and reports on the work of other groups were received.

Résumé

La rencontre du Groupe de travail sur les études liées à la gestion des pêches, qui a eu lieu du 23 au 25 février 1998 au Centre des pêches du Golfe de Moncton (Nouveau-Brunswick), a permis d'examiner deux Plans intégrés de gestion des pêches, de faire des recommandations en vue de la révision du gabarit de la structure et du contenu des plans, et d'adopter une liste de questions qui serviront à l'évaluation de plans futurs. On a examiné une méthode de détection de rejet de petits poissons où l'on compare les fréquences des longueurs des prises observées en mer aux fréquences des longueurs des débarquements lors de vérifications à quai. On a recommandé la tenue d'un projet pilote. Un examen du Programme de vérification à quai (PVQ) concernant les quantités débarquées indique que des améliorations sont déjà en train d'être apportées, mais on recommande de se pencher sur des problèmes à l'extérieur du programme, par exemple la possibilité que des bateaux contournent en partie ou en entier le PVQ ou que des capitaines de navire soient de mèche avec des vérificateurs. On a aussi examiné l'analyse des tendances concernant les échantillons d'observation et les échantillons pris au port, ainsi que les comparaisons des échantillons au port de National Sea Products Ltd. et des échantillons pris en mer pour la mise en application des règlements. On a aussi reçu les conclusions des travaux d'autres groupes.

FISHERIES MANAGEMENT STUDIES WORKING GROUP
REPORT OF MEETING -- 23-25 FEBRUARY 1998

1. Approval of Agenda

The approved agenda for the meeting, held at the Gulf Fisheries Centre, Moncton, is at Annex 1 and a list of attendees at Annex 2.

2. Reports from Other Groups

2.1 ICES WG on Fishing Technology and Fish Behaviour (HALLIDAY)

This WG met in April 1997. The special topic of the meeting was *Selectivity and Efficiency of Static Gear*. The 11 contributions dealt primarily with selectivity and the WG encourages more work on the factors causing variability in static gear selectivity, estimation of survival of escapees, and on gear efficiency. The Study Group on Unaccounted Mortality reported little advancement in providing definitive information on most components of fishing mortality and that a greater commitment by the scientific community and its funding authorities is required if significant progress is to be made. The Study Group will work by correspondence in 1998 and meet again in 1999. The WG's Study Group on the Use of Selectivity Measurements in Stock Assessment worked on methodological development by correspondence in 1997 and plans to meet in 1998. The next meeting of the WG is planned for April 1998 to address, as a special topic, recent selectivity studies of both mobile and static gear in the North Sea. In addition, the report of its Study Group on Grid (Grate) Sorting Systems in Trawls, Beam Trawls and Seine Nets, which failed to report as scheduled in 1997, will be reviewed.

2.2 NAFO Scientific Council Symposium: What Future for Capture Fisheries? (SHOWELL)

The symposium, subtitled *A Shift in Paradigm: Visioning Sustainable Harvests from the Northwest Atlantic in the Twenty-first Century*, was held on September 10-12 1997, immediately prior to the annual meeting of NAFO in St. John's Newfoundland.

Coinciding with the 500th anniversary of Cabot's arrival in Newfoundland, the symposium provided both retrospective and visionary perspectives on the harvest of 'wild' fish species from the Northwest Atlantic. Theme sessions focusing on the history of fishing practices, management approaches, fisheries research, and the role of coastal communities were presented, leading to an update of the present situation and speculation on future trends.

The role of international organizations such as NAFO (ICNAF) in respect to the management of transboundary stocks was highlighted. In future the role of NAFO and other similar organizations will be enhanced, particularly in light of the revised polices of the *UN Agreement of the conservation and management of straddling fish stocks and highly migratory fish stocks* and the *Agreement to promote compliance with international conservation and management measures by fishing vessels*. Trends in international cooperation in fisheries with regard to monitoring, surveillance, control and their future implementation were discussed in light of the

precautionary approach concept and potential management decisions which might be made. Although improvements have been made in NAFO enforcement initiatives in recent years, it was noted that insufficient scientific data were being provided for stock assessment purposes, and that cost effective ways must be found to improve the scientific database.

Areas of fisheries research which might benefit from the application of new or improved technology were identified. These include assignment of stock origin by genetic means, both for the determination of stock structure as well as the origin of fish for the control of closed areas. The integration of environmental signals into the assessment procedure was seen as important in accounting for obvious effects on production and recruitment.

The impact of increased aquaculture development on the future of capture fisheries was reviewed. It was recognized that opportunities to increase aquaculture production were limited by suitable sites and other factors, and that aquaculture would likely supplement capture fisheries by reducing supply variability rather than replacing it.

The following trends were suggested as possible elements of future fisheries:

- Reduced exploitation pressure.
- More transparency in all elements of the management process including stock assessments.
- Increased supplements in fish supply from aquaculture.
- Improved fish capture technology leading to more selective gears and possibly to pre-catch estimation of species and size composition.
- Taking climate fluctuation into account in the assessment of stocks.
- Much more efficient vessels (large vessels with large ranges, small highly efficient vessels).
- A need for a fisheries management science allowing prediction of fleet reaction to restrictions and to biological changes.

2.3 ICES WG on Ecosystem Effects of Fishing Activities (HALLIDAY)

The WG met in November 1997 but the report is not yet available.

3. Business Arising from FMSWG Meeting of 27-28 May 1997 (Proc. Ser. 97/8)

3.1 Production of Minutes

The reports of the WG's meetings in January and May 1997 were distributed as Canadian Stock Assessment Proceedings Series 97/8 in July 1997. Minutes of the present meeting, and of future meetings, will be produced in this series as soon as the minutes of each meeting are finalized.

3.2 Workshop Reports

The proceedings of the workshop on Ecosystem Considerations for Krill and Other Forage Fisheries were produced as Canadian Stock Assessment Proceedings Series (Proc. Ser.) 97/5,

and distributed to attendees of the FMS WG meeting of May 1997 as requested. Also, the proceedings of the Maritimes Region Herring Workshop held in February 1997 and the Atlantic Zonal Herring Workshop of March 1997 were released as Proc. Ser. 97/12 and 97/9, respectively. These reports address management strategies and tactics as well as stock status.

3.3 Co-management/partnerships: a glossary of terms

A DFO internal document entitled "Framework and Guidelines for Implementing the Co-Management Approach", dated 17 April 1997, provides the background necessary to understand the terminology being used with regard to co-management and partnering and no further action by the WG is required.

3.4 Distribution to WG members of another Integrated Fishery Management Plan (surf clams or Scotian Shelf shrimp) as soon as available.

The WG requirements, revised to include both the offshore surf clam and Scotian Shelf shrimp plans, were met (see 4.2).

3.5 Reports on gear research in the Gulf of St. Lawrence in 1996

A further three reports have been acquired by the Chairman on gear research in the Gulf of St. Lawrence in 1996, co-sponsored by DFO Headquarters and the Province of New Brunswick, from J. Branch of the N.B. Department of Fisheries and Aquaculture.

a. *Report on Demonstrations of a Model Twin Trawl in the Marine Institute Flume Tank.* Marine Institute of Memorial University, Fishing Technology Unit Report No. 11/96, 8p (November 1996). The report provides test results for a Nordsea shrimp trawl rigged eight different ways.

b. *Report on the Design, Construction and Testing of Experimental Square and Diamond Codends.* Marine Institute of Memorial University, Fishing Technology Unit Report No. 10/96, 11p (November 1996). The report provides construction specifications for four codends of 130 and 145 mm mesh size with square mesh side panels and diamond mesh top and bottom panels, two for an otter trawl and two for a Danish seine, and gives the results of performance tests of these codends in the flume tank. These codends were for use in selectivity experiments in Div. 4T in August - November 1996.

c. *Groundfish Codend Selectivity Experiments in the Area 4T August - November 1996: Overview and Results Summary.* 7p (November 1996). (This un-numbered report was prepared by the Marine Institute Fishing Technology Unit for the School of Fisheries, Caraquet.) The objective of the experiments was to evaluate the ability of different codends to release small Atlantic cod and American plaice. Six codends were tested by an otter trawler and a Danish seiner, both 45 feet in length, using the alternate tow technique. Codend test mesh sizes were 130 and 145 mm diamond and square and two combinations - 145 mm diamond top and bottom panels/145 mm square mesh side panels and 145 mm diamond top and bottom panels/130 mm

square mesh side panels. Control codend was of 60 mm mesh. The experiments were conducted during 13 trips in four main fishing areas. Results are presented as percentage retention of small fish by the test mesh, estimated by comparison of the numbers of small fish caught in the test and control mesh codends. Thus, the results should be independent of time and area fished. The results for cod show that square mesh netting reduced the retention of small fish (41 cm and smaller) substantially whereas for plaice retention of small fish (size not defined) was as high or higher with square, as with diamond, mesh. These results are in conformity with expectations but this summary report does not provide enough information to evaluate the reliability of the conclusions reached. The detailed report on which this overview and summary is based has been requested. Further work under this N.B.-DFO programme was conducted in 1997, and reports on these activities have been requested also.

3.6 Documentation of DMP implementation, and status of Auditor-General's audit report

Timely and accurate records of fish landings are essential to the Department of Fisheries and Oceans (DFO) for carrying out its conservation mandate. Until 1990, the main source of landings information came from purchase slips, records of sales transactions between fishers and fish buyers.

In 1989-90, DFO established the Dockside Monitoring Program (DMP). The program's objective is to provide accurate and timely third party monitoring of fish landings. DMP initially operated along with purchase slip data collection. Currently, most DFO jurisdictions operate solely with data from DMP. Thus, the Dockside Monitoring Program has become the predominant method for collection of fish landing and fishing effort information.

DMP has been criticized for its failure to produce accurate landings information. A 1996 DFO internal audit review, and the Auditor General in his autumn 1997 report, identified problems of data integrity. Both reviews recommended that quality controls and arms length requirements be introduced, which would ensure there is no conflict of interest between DMCs and the fishers they are monitoring.

In response to these concerns, DFO initiated changes to DMP, including regulatory amendments. DMCs will be required to operate under a certification regime that will establish quality standards and arms length requirements, which would ensure there is no conflict of interest between DMCs and the fishers they are monitoring. As well, fishers will be required to sign landings documentation to ensure that they take responsibility for accurately transmitting catch information to monitors.

It was agreed that introducing a certification regime including arms length criteria, and internal quality controls, would go a long way in addressing problems within the program. Problems external to the program, related to the accuracy of landings statistics, that remain to be addressed are that:

- vessels could be bypassing DMP completely,
- vessels could be landing parts of trips illegally, and
- verification of the landings by the dockside observer could be inaccurate (as a result of collusion).

It was recognized that these potential problems with the accuracy of the statistics would best be addressed through DFO enforcement action or audit procedures.

The Departmental response to the Auditors General Report recommendation 15.72 (4), which address the weaknesses in the DMP, indicated that:

- regulatory amendments to implement changes to DMP should be completed by the spring of 1998, and
- audits of quality control of DMC operations and of landings data to start during the winter of 1998/99.

The Departmental response also stated that the enforcement program is being redesigned and strengthened to improve the reliability of catch information from dockside monitoring programs.

The WG **recommends** that procedures be devised that would ensure the reliability of the landings data. The DMP Working Group, which includes representatives from Science, Enforcement, and Fisheries Management, could provide a suitable vehicle for coming up with a Departmental plan that ensures the issues identified above are effectively addressed. Whatever approach is taken, the FMS Working Group should be kept informed of progress so that it can assist as required.

(ACTION: ANNAND)

3.7 Participation of enforcement staff in the work of the WG

The participation of Brian Wood in the present meeting was invaluable for progress on the main agenda items and illustrated the necessity of continuing representation by enforcement staff in the work of the WG. It is very satisfactory that attendance at future meetings is anticipated also. Brian Wood agreed to discuss with Gulf Sector colleagues the prospects for their regular participation.

ACTION: WOOD)

3.8 Development of a plan of work for evaluation of effort regulation

As requested by the May 1997 meeting of the FMS WG, R. O'Boyle presented a work plan (Annex 3) intended to provide standardized measures of fishing effort which could be used in the on-going monitoring, but not regulation, of a fishery and thus complement current catch controls. The WG accepted the work plan and noted that conduct of this work could facilitate the

incorporation of economic information into stock projections and monitoring. The chairman pointed out that this project had been included in a DFO Strategic Science Fund submission, so there is the possibility of additional funding for this research.

3.9 Use of a precautionary approach in Maritimes Region

R. O'Boyle reported on activities to develop precautionary approaches which have taken place since the May 1997 meeting of the FMS WG. The first initiative was a December 1997 workshop conducted by the Marine Fish Division in preparation for the January 1998 Zonal cod meeting. It was pointed out that the chair of this meeting, A. Sinclair, is planning to provide Proceedings of this meeting. The first issue that the workshop examined was comparisons among BIO, SABS and GFC of the software used in the population assessments. It was determined that, with the same formulation, the software produced the same results. The workshop then considered three methods (least squares approximation, monte carlo and bootstrap) used in the risk analysis, with bootstrapping determined as the preferred approach.

The agenda of the 17 - 27 March 1998 NAFO meeting was tabled. This meeting, which follows on from the June 1997 NAFO meeting, is to develop precautionary harvest levels for the NAFO regulated stocks. It is an important meeting as it will set a precedent for implementation of the precautionary approach in the Northwest Atlantic. It was pointed out that, at the NAFO Fisheries Commission Meeting in September 1998, Canada will be required to either endorse (or not) the conclusions of the March meeting and the results of their application to NAFO regulated stocks. It will be necessary, therefore, for Canada to prepare itself for this meeting. On this note, it was mentioned that the FRCC is planning to conduct a workshop on the precautionary approach subsequent to the March NAFO meeting. This may assist Canada in developing its position on the precautionary approach.

It was noted that the current precautionary approach, as espoused by NAFO and ICES, relies almost exclusively on defining reference points as part of harvest control rules. The WG considered that reference points should not be the only components of a precautionary approach. Indeed, the experience of Canada, with $F_{0.1}$ in particular, suggests that reference points may not be the most important part of the management system and that it is critical to address other sources of uncertainty, not least of which are institutional arrangements. It was pointed out that the activities of the FMS WG are valuable in this regard. No specific activities by the FMS WG were proposed at this time.

4. **Business Arising from FMS Report of 9 July 1997** (Proc. Ser. 97/14)

4.1 Levels of biological sampling of commercial catches

a) ESTIMATION OF DISCARD LEVELS

The Gulf Sector Resource Management Branch indicated, at the July 1997 Fisheries Management Subcommittee meeting, that it wishes to formalize a protocol for closing a fishery when illegal discarding is occurring. Two types of discarding are involved, discarding of

unwanted bycatch species and discarding of specimens of the directed species that are below the legal size. The Fisheries Management Subcommittee agreed to study this issue and provide the Gulf Sector with the requested protocol, and referred the matter to the FMS WG as follows:

> The FMSWG is to study this issue, set up a protocol that would define fishery closures in relation to discard rates, and table this for discussion at the February 1998 meeting of the Subcommittee. The results of the Subcommittee would then be presented to the Gulf Groundfish Advisory Committee in May 1998.

With regard to methodology, two studies are relevant. The following paper has just been published: J. Allard and G. Chouinard. 1997. *A strategy to detect fish discarding by combining on-board and on-shore sampling.* CJFAS 54: 2955-2963. J. Allard (Université de Moncton) presented this paper on a method to detect whether discarding of fish at sea has likely taken place. The method is based on the changes in the length frequency distributions that are caused by the discarding process. A discarding indicator was developed as the difference between the slope of the frequency distribution just above and just below the minimum size. In mathematical terms, this is equivalent to the second derivative or the change in slope. In samples where discarding takes place, one would expect that this indicator would be generally larger than in samples taken from vessels where discarding did not take place. By comparing the discarding indicator from samples collected at dockside to the discarding indicators of a set of reference samples collected by observers where discarding did not take place, the probability that discarding occurred can be assigned to each of the samples collected at dockside.

The method was tested using samples from the autumn 1991 mobile gear fishery for cod in the southern Gulf of St. Lawrence. The fishery took place primarily in Div. 4Tfg (eastern southern Gulf) and samples were from seiners and trawlers. The minimum mesh size in effect at the time was 130 mm diamond, the minimum fish size was 41 cm and discarding was not prohibited at that time. During that fishery, observers collected samples on board the vessels either before or after discarding had taken place. The type of sample (discarding or non-discarding) was known for all samples. The discarding indicators were then calculated for the samples on a set by set basis. A second analysis calculated discarding indicators on a trip by trip basis.

In both cases, the mean of the discarding indicator was higher for discarding samples than non-discarding ones. There was overlap in the indicators which could be caused by sampling variation or in instances where the amount of discarding was minimal. Using the external distribution concept, samples from both groups of samples were classified and the proportion of misclassification calculated. For equal Type I (classifying a non-discarding sample as discarding) and Type II (classifying a discarding sample as non-discarding) errors, it was found that all samples would be classified correctly in about 75-80% of the cases.

The WG considered that the method could be used in several manners. It could be used in real-time to assist in enforcement activities by identifying suspect vessels, to close fisheries where discarding appears rampant, or in a quality control approach. Real-time application of the method would require that samples be rapidly available in electronic form after their collection. It could also be used after the fishery to evaluate the extent of discarding occurrences or in

decisions regarding necessary management measures (level of observer coverage, etc.) for the upcoming season.

There was concern expressed regarding the large number (>50) of observer samples required for the reference set. It was noted that observer coverage was not sufficient in several small fisheries to allow for the application of the method. On the other hand, the results suggested that the distribution of the discarding indicator was near-normal. If that is shown to be similar in other cases then the use of the normal distribution in the calculations would reduce the number of samples required. For good performance of the method, it is likely going to be necessary to stratify samples according to area, gear type, mesh size, season and year. Each of these 'strata' would require a reference set collected by observers.

It was also noted that there may be cases (e.g. fast-growing stocks, bimodal length distribution near the minimum size) where the method might not be applicable. The method would need to be examined individually for each fishery.

The WG considered that the external distribution concept could be useful to examine other issues such as by-catch levels, species composition of the catch, etc. Further research is required to determine whether the method can be extended to the estimation of discard rates. The WG was informed that work in that direction is presently ongoing.

Finally, the WG concluded that the method appears to be useful but would require further evaluation. Given the latter and that the method cannot provide estimates of discard rates, it is not possible to set-up a specific protocol to trigger fishery closures at this time. Therefore, the WG **recommends** that, before the method is applied in a routine fashion, a pilot project should be conducted in a specific fishery (during 1998 if possible). This would provide the opportunity to examine and determine more precisely the logistics, protocols and data flow, identify any problems in implementation and further evaluate the method.

The second study was available as a working paper prepared by Fanning, Marsh and MacEachern on discarding in the 1980s commercial groundfish fishery. It was presented by R. O'Boyle in the absence of the authors. This paper had been tabled at the 26 January - 6 February 1998 Zonal Cod meeting in St. John's, Newfoundland and was presented to the FMS WG for information.

The working paper reported progress on three avenues of research. The first summarized the results of two fisherman interview surveys, one conducted by T. Kenchington in 1996, the other conducted by K. Marsh in 1997. The second project involved the analysis of observer and logbook data, matched to discern discarding patterns in the offshore fleet. In a new facet of this project, discard data recorded in offshore vessel logbooks in 1981-90, but never keypunched, were processed and preliminary analyses undertaken. The last project reported on comparisons between at-sea and port size frequencies. The analyses in these projects have not progressed to the point where conclusions about discarding can be made. Notwithstanding this, the data sets have potential to address long standing issues on historical discarding patterns. The FMS WG is much interested in seeing the final results from these projects.

b) LEVEL OF OBSERVER COVERAGE

Ottawa's decision to put all observer coverage on a user-pay basis for 1997 and subsequent years opened for debate the question of appropriate coverage levels for each fishery / fleet sector. The levels proposed for user-pay coverage by Ottawa were, in some cases, substantially above those achieved previously under DFO funding. DFO negotiators met with substantial Industry resistance to the concept of paying for the coverage levels decided on by Ottawa or, indeed, to funding any level of observer coverage. The problem was exacerbated by the lack of a clearly expounded rationale for the proposed coverage levels. As a result, observer coverage in 1997 was very low in some instances and a number of DFO activities were adversely affected, including the ability to conduct some stock assessments. Some criteria need to be agreed upon, based on technical analyses, for establishing the necessary levels of observer coverage for specific fisheries.

To provide a perspective on levels of observer deployments in recent years, trends in observer coverage were presented, measured as a proportion of total trips and total landings, from Scotian Shelf groundfish fisheries. Data from the MFD observer database were matched with landings data from the DFO statistical system to provide a time series from 1989 to 1997. The information was then aggregated by vessel size, gear category, and directed species group (cod, haddock and pollock; redfish; silver hake). From 1989 to 1996, observer coverage levels were highest on large (Tonnage Class 4+) vessels and the mobile gear sector, generally at 10% or higher. With user pay in 1997, coverage on this vessel size group and gear category dropped to about 6%. Coverage on small vessels was lower relative to the large vessels, but increased from 1989 to 1997, to about 3%. Observer deployments to the fixed gear sector also increased over the time period, but was still less than 1% in 1997. Coverage of cod/haddock/pollock fisheries on the Scotian Shelf was relatively consistent from 1989 to 1996, at approximately 10%, but declined to 3% in 1997. Coverage of redfish directed fishing activity was higher than that of cod/haddock/pollock, at about 20% for most years, and remained high in 1997 at 15%. Silver hake, as a developing fishery, was covered at high levels from 1994 to 1996, but observed landings dropped to 1% of the total in 1997.

Observer coverage levels realized in recent years are considerably below those proposed as a national policy by Conservation & Protection, Ottawa. C. Annand indicated that the Maritime Region had recently decided to implement an alternative strategy for user pay observer coverage, which stipulates observers would only be deployed to address specific issues. Industry was subsequently notified of this decision. Other WG members were unaware of this decision and distribution of correspondence on regional coverage level policy to WG participants was requested.

(ACTION: ANNAND)

It was recognized that even where observers were deployed to address specific issues negotiation would be required to arrive at an agreed level, and that a more detailed breakdown of recent trends in coverage by fleet and area would be useful. It was further noted that the coverage

situation is complicated by the fact some fleets are fishing under Temporary Vessel Replacement Program (TVRP) allocations, and a breakdown incorporating this factor would be valuable.

(ACTION: ANNAND - to supply available TVRP information since inception in 1990 and required species and fleet/area combinations.
ACTION: SHOWELL - to provide more detailed account of observer coverage trends.)

Issues that some level of observer coverage might be required for include:

1. Discarding of fish under minimum size limits.

Deployments would be restricted to particular situations where the potential for capture of high numbers of small fish is recognized, e.g. because a large year class is expected to enter the fishery or there have been chronic problems with capture of small fish. Deployments are also a necessary precursor to reopening of a closed area.

2. Discarding of bycatch species (because of low value or because capture quantities are limited by regulation).

Deployments would be restricted to particular situations where the potential for significant discards is recognized, e.g. very restrictive bycatch limits are imposed to protect depressed stocks of important species or there have been chronic problems with high discards such as in some flatfish fisheries.

3. Small mesh fisheries.

Deployment of observers should be an element of routine monitoring in all such fisheries as bycatches can be high and are often also composed in large part of small fish. Even when bycatch tonnages are moderate or low, if they are composed of small fish, numbers of fish wasted can be very high.

4. Fisheries in which fish are processed at sea and thus not available for sampling ashore.

In these circumstances, the only data for stock assessment, and thus the only data on which to develop a management policy, are those collected at sea.

5. Developmental fisheries.

These fisheries, at their initial stages, require full description of all aspects of at-sea operations, and require a high level of coverage.

6. Area of capture.

Where there is a serious problem with misreporting of management area of capture, shore samples could be misclassified as to stock of origin. If length composition of adjacent stocks differ substantially, observer samples could be used to provide a key to area of origin of shore samples.

For observers to be deployed at industry expense, DFO should identify 1) what the concern is, 2) how observer coverage would address the problem, 3) what level of observer coverage would be necessary, and 4) an evaluation of alternative approaches to addressing the problem. It was recognized that ability to pay is an important criterion in decision making, but so too is the need to adopt methods that had a high probability of successfully addressing the issue in question. It was decided that the next step is to consult with interested parties to develop a list of specific issues, by fishery (finfish and invertebrates), for which observer coverage might address the problem.

(ACTION: SHOWELL)

c) UTILITY OF ENFORCEMENT SEA SAMPLES FOR BIOLOGICAL PURPOSES

For the past four years, offshore surveillance officers in the Scotia-Fundy Sector, Maritimes Region, have been measuring and recording the size composition from groundfish catches sampled during at-sea surveillance boardings. These samples are unique as they provide size compositions at sea, before any culling has occurred, of catches made by fishermen who were unaware at the time the gear was set that their catch would be subject to inspection. This is in contrast to other sea sampling, e.g. by observers when fishermen's' choice of fishing location may be influenced by the knowledge that catch size composition will be observed. A project was initiated to evaluate the usefulness of these samples to improve Science Branch estimates of total removals-at-age. A progress report was presented.

A review of the sampling protocols for at-sea surveillance sampling, based on interviews with the surveillance officers involved, suggested that these were probably adequate for stock assessment purposes: vessel selection is typically opportunistic once the target area was identified in consultation with the groundfish advisors; subsamples are randomly selected when the catch is large enough to require a subsample; an offset board is used and fork length is the measure taken. However the interview sample represented a small proportion of the officers involved in sample collection during the past four years and it was agreed that a larger sample of the officers involved in the sampling should be interviewed, to ensure that these protocols have been in general use.

(ACTION: WOOD)

It was suggested also that Science staff might participate in surveillance officer training and/or annual consultations to increase awareness on both sides about this sampling activity and its usefulness.

In the course of interviewing surveillance personnel, it was determined that some shore-based sampling has also occurred but that sampling protocols were not as well defined and the data are not systematically recorded. It was also reported that there may be a reluctance to see greater use made of these shore-based samples, as it was felt this would only lead to increases in discarding.

A total of 594 at-sea samples, from 11 species, were obtained and have been entered into observer program Oracle tables for analysis. The majority of samples were from cod and haddock and primarily from NAFO Div. 4X. Preliminary analyses for 4X and 5Z haddock were presented. Comparisons with samples from other sources were complicated by the generally small numbers of fish in the surveillance samples (57% of 4X haddock samples had more than 100 fish and 12% had more than 200 fish). Nonetheless the results of these preliminary analyses were encouraging and they demonstrated that at-sea surveillance samples may be useful for scientific purposes. However further analyses are required; the WG encourages this work and looks forward to seeing the results. Due to the need to weight pooled samples, catch weight is important, but is not available for all samples. In addition, the reason for boarding would also be valuable ("routine" or "other" would be adequate). It was decided to inquire if these two pieces of data could be consistently reported.

(ACTION: WOOD)

d) LEVELS OF PORT SAMPLING

The port sampling programme of Science Branch in the Maritimes Region has operated for about 50 years essentially unchanged in policy, procedures and staffing levels. However, Science downsizing in the last few years has resulted in a halving of the staffing level for the Scotia-Fundy Sector port sampling programme. This has necessitated a review of programme performance and a reconsideration of necessary sampling levels. R. Branton presented two reports on the subject of port sampling in the Scotia Fundy Sector.

The first report "A Review of Maritimes Region Port Sampling for the Period 1989-97" showed that although two of the five port technicians in the area had retired without replacement and the number of samples per year had declined, the sampling ratios (samples / thousand tons landed) were higher in 1997 than in period 1989-92. Factors which contributed to the increased sampling ratios included: decreased landings for almost all stocks since 1992, in-plant sampling by National Sea Products Limited during 1997, and improved port sampler productivity as a result of access to computerized hail-in systems.

With regard to definition of appropriate sampling levels, it was recognized that the distribution of samples was as or more important than total numbers of samples. Since sampling needs are expected to vary between stocks and types of assessments (e.g. analytical stocks vs. minor stocks), a consultation is needed with stock assessment scientists to develop a common view of

the criteria to be used for defining sampling requirements. In addition, a statistical methodology should be considered to address the issue of what is a satisfactory level of sampling for particular purposes.

(ACTION: BRANTON)

The second report "A Comparison of Length Frequency Samples taken in 1997 by National Sea Products Limited and Marine Fish Division" gave the results of several comparisons which showed no evidence of systematic bias in the National Sea Products samples taken during 1997. It appears, therefore, that these samples can be taken as equivalent to MFD port samples. Nonetheless further evaluations were thought worthwhile, including: comparison with observer samples for the same trips, and a multi-dimensional scaling type comparison of size composition samples to determine if there are significant differences associated with sample origin. In the mean time, individual assessment scientists are encouraged to conduct their own detailed review of all samples used for assessment purposes regardless of their source.

4.2 Review of management plans

The Departmental briefing document, *Framework and Guidelines for Implementing the Co-Management Approach* (April 17,1997) provided the background necessary to understand the co-management initiative and a definition of terms. Also available was the Departmental *1996 Integrated Fisheries Management Plans (IFMP): Final Audit Report* (October 1997) which analyzed progress in implementing this new planning process in 1996 and made a number of recommendations for improvement. This document also provided, in its Annex VII, the *Suggested Content of a Typical IFMP* which presumably represents the latest Departmental thinking about the content and structure of a plan.

The following *Description of the Fishery Management Process* was accepted by the FMS WG at its January 1997 meeting (Annex 3 to Report, Proc. Ser. 97/8, p15):

FISHERY MANAGEMENT PLANNING

The following are the necessary elements of fishery management planning and implementation:

-- a structure and process for decision-making;

-- a statement of policy;

-- criteria which describe satisfactory system performance (i.e. operational definitions of policy objectives);

-- selection of mechanisms (strategies) through which objectives are to be achieved;

-- choice of tools (tactics) to implement the plan;

-- encouragement of compliance with management measures adopted;

-- collection of data on key indicators of system performance; and

-- system performance review procedures.

This statement was taken as a basis for evaluating Annex VII of the Audit Report, i.e. the *Suggested Content of a Typical IFMP.* (Annex VII of the Audit Report is appended to this report as Annex 4.)

Annex VII requires that a plan have a statement of *long term objectives for the fishery* (plan element 3) but there is not a clear distinction between this and element 4, *general management objectives.* This problem was noted in the Audit Report, Recommendation 20 of which was:

> *- the difference between long term objectives for the fishery and strategic management objectives be clarified.*

To promote this necessary clarification, element 4 of the IFMPs should be labeled *management strategies*. (Much of the suggested content of element 4 in Annex VII of the Audit Report could best be included as amplifications of element 3, *long term objectives*.) Strategies describe the approaches that will be adopted to achieve long term objectives, e.g. sustainability may be pursued by adopting a harvest strategy of $F_{0.1}$, fleet rationalization by licence buybacks, economic viability by adoption of ITQs. It would be desirable if long term objectives for particular fisheries could be framed in the context of an overall national fisheries policy.

A particularly important element of Annex VII of the Audit Report is its Annex I: *management plan evaluation criteria.* The Audit Report recommendation 19:

> *- activities and measures planned under IFMPs should be described in specific and measurable terms*

is much to the point here. This Annex I should describe and justify the performance indicators, or benchmarks, that will be used to measure progress towards meeting long term objectives. For example, a performance indicator of the harvest strategy is the fishing mortality, F, whereas for economic viability it could be a positive level of net income. These evaluation criteria are intimately linked to management strategies and should be noted also in the main body of the plan.

Current management issues (element 5) are an essential part of the plan but should precede element 4 which describes the way these issues are to be addressed.

Management measures (element 6) equate to tactics for implementing the strategies adopted and should be more than a list. These should be justified as satisfactory ways to bring the plan into effect.

Similarly, *enforcement issues* (element 7) should not simply list surveillance activities but should identify the key enforcement problems, i.e. problems that will prejudice the success of the plan if not resolved. It should provide the rationale as to why the enforcement plan would be expected to result in a satisfactory level of regulatory compliance or provide a performance indicator to show whether objectives are being attained.

There is no provision in this "typical IFMP" for identification of essential data requirements for evaluation of plan performance. An additional plan element is justified that would describe the necessary data collections and analyses required to evaluate the effects of the regulatory and enforcement actions taken and to measure progress towards objectives. Omitted also is provision for a technical performance review, and scant attention is paid to decision-making procedures with regard to the plan provisions. In other words, the institutional framework within which the plan is implemented and revised is not adequately articulated.

The above review of Annex VII of the Audit Report was taken as the basis for framing a number of questions against which particular IFMPs could be evaluated. That list follows:

Long-term objectives for the fishery (Plan Element 3).

-Are there clearly stated long-term objectives for the fishery?

-Do the objectives cover all elements of the fishery, not only conservation, i.e. are economic objectives (returns on investment, economic viability without subsidy, resource rent) and social objectives (employment levels, wage levels, distribution of benefits among communities) included?

Management objectives and current issues (Plan Elements 4 and 5). Also Annex I of Annex VII - Management Plan Evaluation Criteria.

- Are there management strategies identified in relation to each of the long term objectives in the plan?
- Are the choices with regard to strategies backed up by the results of analyses indicating that the long term objectives for the fishery will be met, or at least that some established benchmark toward that goal will be met?
-Are the management strategies expressed in quantitative terms such that progress toward meeting them can be measured?

Management measures (Plan Element 6).

-Are the management measures, (i.e. tactics) proposed related back to the strategies and is some rationale provided to indicate that they are an effective way of implementing these strategies?
-Are there tactics for implementation of all strategies?

Enforcement issues and strategies (Plan Element 7). Also Annex II of Annex VII - Conservation and protection plan evaluation criteria.

-Are the enforcement measures proposed related back to the tactics adopted and is some rationale provided to indicate that they are an effective way of ensuring compliance in this fishery?
-Are there enforcement measures for implementation of all tactics?

Performance indicators.

-Have key indicators of system performance been identified for all major plan elements?
-Has provision been made to collect the appropriate data to evaluate the success of the measures taken and progress towards objectives (i.e. in relation to the key indicators)?

Performance review.

-Is a formal review procedure specified by which performance of the plan will be evaluated through technical analysis, and by which the success or failure of the plan, and its various elements, will be documented?

Decision-making.

-Is there an institutional structure that provides for input of all relevant parties?
-Is there a process that requires plan revisions to rectify deficiencies identified as a result of performance review?

The following IFMPs were chosen for review because they were at an advanced state of development and also because they concerned specialized fisheries and hence were among the less complicated IFMPs:

- *Proposed Offshore Surf Clam Integrated Fishery Management Plan, Maritimes and Newfoundland Regions, 1998-2002* (November 4,1997). Also Joint Project Agreement.

- *1998-2002 Scotian Shelf Shrimp (*Pandalus borealis*) Integrated Fisheries Management Plan, Scotia-Fundy Fisheries, Maritimes Region* (Undated).

These two plans were used as test cases for IFMP evaluation using the questions framed above.

PROPOSED OFFSHORE SURF CLAM INTEGRATED FISHERY MANAGEMENT PLAN, MARITIMES AND NEWFOUNDLAND REGIONS, 1998-2002.

Long-term objectives for the fishery (Plan Element 3).

The Plan does contain a list of long term objectives in Plan Element 3. However, this list covers a very wide scope, and the objectives are not clearly stated. They require amplification to be fully understood. The list encompasses economic and conservation objectives, including the objective of minimizing "adverse environmental effects" which recognizes one of the main conservation issues with regard to this fishery. There are no social objectives stated although the notion of "benefits" to Canadians may be interpreted as a general, unspecific social goal.

Management objectives and current issues (Plan Elements 4 and 5). Also Annex I of Annex VII - Management Plan Evaluation Criteria.

Plan Element 4 follows precisely the template of Annex VII and is entitled "General Management Objectives". It also contains the accompanying subsections as suggested in Annex VII. As a consequence, this section does not correspond directly to the listed long term objectives of the previous section in the Plan but merely qualifies them. These would be better included in the previous section. Neither does this section detail "strategies" associated with means of achieving the long term objectives, e.g. the evolution toward "scientifically based management plans" (4.1) is a management objective that requires the implementation of specific analyses to be realized. The Plan does not identify management strategies to achieve the long term objectives and consequently there are no analyses indicating whether or not the long term objectives for the fishery will be met.

Management strategies absent from Section 4 in the Plan could be implied from Plan Element 5, "Current Management Issues", e.g. 5.1 on "sustainable yield" refers to the issue of determining a scientifically based TAC as was also noted in 4.1. In general, the conclusions were that management strategies are stated implicitly in the Plan but are not tied to each of the long term objectives. Part of the explanation for this could be attributed to following the template of Annex VII too strictly. Consequently, benchmarks and quantitative targets associated with management strategies are not provided.

Management measures (Plan Element 6).

As above, the management measures are not clearly identifiable from the Plan and are not related to the strategies. As well, under Plan Element 6, "Management Measures" were not

distinguishable from monitoring and enforcement strategies presented in element 7 of the Plan. For example, "Gear Restrictions" (7.4) could be included as a management measure. Moreover, it was noted that further information should be provided with respect to the impact and intent of the management measure, e.g. gear restrictions are such that catches are of clams well above reproductive size but nonetheless do not prevent a high mortality of clams left behind.

Enforcement issues and strategies (Plan Element 7). Also Annex II of Annex VII - Conservation and protection plan evaluation criteria.

The Plan provided no links between enforcement strategies and management measures or "tactics". As a result, there is little evidence to indicate that the enforcement measures identified are an effective way of ensuring compliance with the management measures adopted.

There is confusion in the Plan between enforcement (Plan Element 7) versus management measures (Plan Element 6). All items in Plan Element 7 appear to be management measures with the exception of 7.7 "At-Sea Observers". There is, as before, very limited connection between enforcement and tactics, including no reference to use of licence conditions as an enforcement strategy. An adjustment is warranted to avoid listing as management measures those items that are properly listed in Element 7, unless accompanied by a clearly explanation about why they are there.

Performance indicators.

The Plan does not contain performance indicators. With respect to data collection, however, the DFO research program items of Plan Elements 8.1, and 8.2 include a provision for data collection. It was also noted that the DMP may provide data that can be used to evaluate plan performance.

Performance review.

Reference to a formal review procedure is contained in the Plan under the elements 1.7 (Consultative Process) and 1.8 (New Management Style). This work is done through the active participation of the Offshore Clam Advisory Committee (OCAC) and the Offshore Clam Management Board (OCMB). However, specification of requirements for a technical evaluation is not explicit.

Decision-making.

The Plan does not document the institutional structure and decision making process integrating the relevant parties associated with the fishery. However, it is noted in 1.8 (New Management Style) that a new management body, the OCMB, will be established that is responsible for recommending changes to the IFMP and for providing an annual report on the fishery.

1998-2002 SCOTIAN SHELF SHRIMP (*PANDALUS BOREALIS*) INTEGRATED FISHERIES MANAGEMENT PLAN, SCOTIA-FUNDY FISHERIES, MARITIMES REGION

Long-term objectives for the fishery (Plan Element 3).

The Plan presents a list of seven "Management Objectives" and as for the surf clam plan, these require further elaboration.

Management objectives and current issues (Plan Elements 4 and 5). Also Annex I of Annex VII - Management Plan Evaluation Criteria.

Section 4 of the Plan, "Current Management Issues" includes a number of items not necessarily relevant to management strategy definition, e.g. 4.1 and 4.2 refer to the consultative and decision making processes, and the management regimes in place. As a result, the list of management issues does not link directly back to the stated management objectives. Strategies are not laid out clearly in this section, instead they are scattered throughout the Plan.

Management measures (Plan Element 6).

The Plan contains 13 management measures designed to inform fishermen of the regulations. Nonetheless essential elements are missing, e.g. gear and grate restrictions. Even though these gear restrictions are implemented as conditions of licence, and are described there, they should be specified in the plan also. As for the management strategies, it is unclear how the management measures relate to the stated objectives. Much of the content of this element would be better placed in an annex of information for fishermen.

Enforcement issues and strategies (Plan Element 7). Also Annex II of Annex VII - Conservation and protection plan evaluation criteria.

Monitoring and enforcement strategies provide the relevant information in a non-technical fashion. However, these could be more closely related to specific management measures in the Plan.

Performance indicators.

As in the case for surf clam, the shrimp Plan is without any performance indicators with respect to the evaluation of the Plan.

Performance review.

The Plan includes information on performance review in section 1.5 (Consultative Process) and in section 4.1 (Annual Report and Amendment).

Decision-making.

Sections 4.1 and 4.2 of the Plan present the review and consultative process for the fishery.

CONCLUDING REMARKS

The review of these two IFMPs revealed a number of similarities:

- There is an absence of clearly defined, quantifiable measures for long term management objectives and management strategies. This issue is addressed specifically in the Audit Report, but does not appear to have been embraced in the plans reviewed.

- Objectives, strategies, tactics and regulatory measures are not explicitly linked in the plans reviewed. This may stem directly from the point above; there is an obvious need to define clearly the objectives of the plan as the focal point for developing strategies and associated tactics.

- Institutional arrangements for plan performance review, specifically the need for a technical analysis function that includes Science, Economics, Enforcement, Resource Management and industry participants, are not described explicitly.

The Audit Report template is not fully adequate for the development of effective management plans. From the plans reviewed, there appears to be considerable confusion with regard to what should be included in the plan section by section. Specifically, there are definitional problems related to terminology, e.g. biological "sustainability", economic "viability" and "stability", and no recognition of the need for performance review and decision making mechanisms.

The WG regards the introduction of the Integrated Fisheries Management Plan as one of the most important initiatives by DFO in many years. The two plans reviewed represent a major, indeed revolutionary, step forward in the planning process. The objective of the present review was to identify deficiencies in the planning process itself (and not in these two plans *per se*) and to make suggestions for improvement during the present formative stage of the IFMP process. As a result of this review, the WG **recommends** that modifications to the template provided in Annex VII of the Audit Report be considered in the light of the above critique. The questions devised by the WG for plan evaluation were found to be suitable in relation to the two plans reviewed and it is **recommended** that the WG's list of questions regarding the content and structure of IFMP's be applied in the evaluation of other plans.

5. New Business

5.1 Additional remits from the RAP Coordinating Committee meeting, 19 September 1997

Not addressed due to time constraints.

5.2 Strategic Science Funding Proposal

Not addressed due to time constraints.

6. Other Matters

6.1 Next meeting

The next meeting will be held prior to the next meeting of the Fisheries Management Subcommittee, expected to be in early summer, if there is substantive business to conduct.

Annex 1.

AGENDA
Fisheries Management Studies
Working Group Meeting
23-25 February 1998

1. Approval of agenda

2. Reports from other groups

   2.1 ICES WG on Fishing Technology and Fish Behaviour, April 1997. (HALLIDAY)

   2.2 NAFO Scientific Council Symposium: What Future for Capture Fisheries?, September 1997. (SHOWELL)

   2.3 ICES WG on Ecosystem Effects of Fishing Activities, November 1997. (HALLIDAY)

3. Business arising from FMSWG meeting of 27-28 May 1997 (CSA Proc. Ser. 97/8)

   3.1 Production of Minutes (HALLIDAY)

   3.2 Krill Workshop report (O'BOYLE)

   3.3 Co-management/partnerships: a glossary of terms (PEACOCK & ANNAND)

   3.4 Distribution to WG members of another Integrated Fishery Management Plan (surf clams or Scotian Shelf shrimp) as soon as available (ANNAND)

   3.5 Reports on gear research in the Gulf of St. Lawrence in 1996 (HALLIDAY)

   3.6 Documentation of DMP implementation, and status of Auditor-General's audit report (ANNAND)

   3.7 Participation of enforcement staff in the work of the WG (HALLIDAY)

   3.8 Development of a plan of work for evaluation of effort regulation (A. SINCLAIR, GAVARIS, O'BOYLE)

   3.9 Use of a precautionary approach in Maritimes Region (O'BOYLE)

4. Business arising from FMS Report of 9 July 1997 (CSA Proc. Ser. 97/14)

   4.1 Levels of biological sampling of commercial catches
      a. Estimation of discard levels (CHOUINARD and FANNING)

b. Level of observer coverage (SHOWELL)
c. Utility of enforcement sea samples for biological purposes (HURLEY and WOOD)
d. Levels of port sampling (BRANTON)

4.2 Review of management plans (HALLIDAY)

5. New business

5.1 Additional remits from the RAP Coordinating Committee meeting, 19 September 1997 (O'BOYLE)

a. Review of the Community Management Board (CMB) approach

5.2 Strategic Science Funding Proposal (HALLIDAY)

6. Other matters

Annex 2.

List of Participants

Jacques Allard, Dept. of Math. and Stat., University of Moncton, Moncton (24 Feb. PM)

Christina Annand, Resource Allocation Branch, Halifax

Valerie Bradshaw, Resource Allocation Branch, Halifax (23 Feb. & 24 Feb. AM)

Leo Brander, Policy and Economics Branch, Halifax (24 Feb. PM & 25 Feb.)

Robert Branton, Science Branch, BIO, Dartmouth

Ghislain Chouinard, Science Branch, GFC, Moncton

Peter Comeau, Science Branch, BIO, Dartmouth (25 Feb.)

Ralph Halliday, Science Branch, BIO, Dartmouth

Réjean Hébert, Resource Allocation Branch, Moncton (23-24 Feb.)

Thomas Hurlbut, Science Branch, GFC, Moncton (24 Feb. PM & 25 Feb.)

Peter Hurley, Science Branch, BIO, Dartmouth

Peter Koeller, Science Branch, Lower Water St. Lab., Halifax (23 Feb. & 24 Feb. AM)

Dan Lane, Faculty of Administration, University of Ottawa, Ottawa

Rod Morin, Science Branch, GFC, Moncton (24 Feb. & 25 Feb. AM)

Robert O'Boyle, Science Branch, BIO, Dartmouth

Dale Roddick, Science Branch, Lower Water St. Lab., Halifax (23 Feb. & 24 Feb. AM)

Mark Showell, Science Branch, BIO, Dartmouth

Brian Wood, Conservation and Enforcement Branch, Halifax

Annex 3.

FMSWG Team on the Evaluation of Effort Regulation
Minutes of 2 September 1997 Teleconference

Attendees: R. O'Boyle (chair), S. Gavaris, A. Sinclair

The meeting was opened by the chair who first gave some background The Fisheries Management Studies Working Group (FMSWG) met on 27-27 May 1997, during which one of the topics discussed was the need to develop a work plan to address research questions relating to the relationship between fishing mortality and effort. It was recommended that this plan be presented to the WG at its fall 1997 meeting. Bob O'Boyle agreed to co-ordinate compilation of this plan.

The group briefly reviewed the purpose of the project, which is to provide standardized measures of fishing effort to allow use of this information in the on-going monitoring of a fishery and thus to complement current catch controls. It was emphasized that the effort data should not be used as a regulatory control but rather as a monitoring tool. In other words, projections of expected effort use by fleet could be conducted and then observed effort monitored to watch for anomalies either in the fishery or in the stock assessment. It was pointed out that whereas catch rate standardization has been done for trawler fisheries for which effort data is plentiful, this is not the case for the fixed gear sector for which there is a paucity of information and different measures of effort.

Besides the difficulty of effort definition, there is that of the directivity of a fishery. In recent years, the regulatory changes have caused the fleets to change their fishing behaviour so that directed species are now caught as a by-catch in new directed fisheries. This complicates interpretation of the effort data significantly and is an issue that needs to be investigated in a couple of case studies before being considered more broadly. It was felt that the 4T and 4X/5Z fisheries would be good case studies for the approach presented below.

There are three steps proposed for the project:

1. Classification of the fisheries

Using the set by set information, it may be possible to define through ordination techniques, the degree of directivity of a particular set, i.e. was this a cod or haddock directed set? This is based on the assumption that on a set by set basis decisions are being made on the desired species regardless of the aggregate trip catch. Using an ordination approach may allow identification of all sets of a particular directivity. These would then form the input data to the next step.

2. Catch Rate Standardization

The ordinated sets for a particular directivity, e.g. cod directed, would be subjected to a multiplicative analysis to describe the year, season, gear, area and other relevant effects. This analysis would provide the effort data for the last step.

3. Definition of fishing mortality - effort relationships

On a fleet by fleet basis, the annual partial F matrices would be calculated and these fishing mortalities regressed against the effort data from step 2 to provide catchability coefficients by fleet, season, area and so on. These coefficients would ultimately be used in the projections to produced expected levels of fishing effort which would then be compared to observed levels on an on-going basis.

The group agreed that this proposal be tabled at the FMSWG meeting of fall 1997 to seek approval on the approach and encourage co-operation in the analyses.

Annex 4.

1996 INTEGRATED FISHERIES MANAGEMENT PLANS (IFMP)
FINAL AUDIT REPORT - OCTOBER 1997

ANNEX VII

SUGGESTED CONTENT OF A TYPICAL IFMP

Note: Where a section does not apply to the fishery, state so and why.

0. Cover Page

Indicate species, fishing area and year(s) covered by plan.

00. Table of Contents

000. Glossary

Provide short definitions of technical/special terminology used in document.

INTRODUCTION

Short text presenting the document, including period covered, special annexes if different from norm and why they are attached.

BIOLOGICAL SYNOPSIS

Short text outlining the main biological characteristics of the species, with emphasis on the aspects which impact on management of the species (e.g., spawning time and areas, migration routes and timing, growth rates, sexual characteristics,...). Include picture and scientific name of species.

1. OVERVIEW OF THE FISHERY

Short historical, geographical perspective of the fishery. Include such things as its development and important milestones. Mention type(s) of gear used if not explained elsewhere in document, i.e. baited traps. Mention of key or pressing issues if applicable.

1.1 Participants

Provide number of participants by fleet, including aboriginal, commercial and recreational sectors, crew members; describe where they are located if pertinent (distribution of effort). Include number of processing plants.

1.2 Location of the Fishery

Describe the areas or zones where fishing occurs (regulatory zones and specific area of vessel operation). Best presented through maps.

1.3 Time frame of Fishery

Outline legal fishing seasons as well as effective period of activity.

1.4 Landings/Value/Markets

Provide historical info on landings and values (10-year period suggested). Describe or provide info on any significant drops or increases, trends. Include historical landed price and total value of landings. Use charts preferably. Brief market information and short description of most important products and areas exported to.

1.5 Consultative Process

Describe types of committees which are part of the process (based on zones/area, or regional only, or Atlantic only). Mention level of approval for plan (Area/RHQ/ADM/Minister). Add terms of reference and membership in annexes.

1.6 Management Styles

Describe type of method used to manage the fishery: if based on TAC, mention how split up in %. If based on IQ's mention how IQ's are arrived at; if based on input controls (as for lobster) list most significant controls.

2. STOCK STATUS

2.1 Biology, Environment, Habitat

Brief description of biology including major life cycles events, age when species reaches harvestable size, environment and habitat in which species lives, including depths, temperatures, migration patterns. Mention if significant changes in any of above have or are occurring.

2.2 Species Interactions

Describe predator/prey relationships, food requirements if depended on other commercial species, competition with other species for food/space.

2.3 Assessment

Describe assessment process for the stocks and what is being assessed (surveys, trawls, tagging, index fishers, CPUE, landings stats, sentinel fisheries, etc.). Outline how final advice is provided to managers.

2.4 Research

Describe research projects being undertaken/conducted during period of the plan and their purpose.

2.5 Prospects for (period covered by Plan)

Outline trend in stock status (where it was and where it appears to be going: increasing, decreasing, aging, etc.). Provide short summary of stock status reports and refer to these reports for persons looking for more detailed information.

3. LONG-TERM OBJECTIVES FOR THE FISHERY

If specific targets for the species exists, describe (e.g. lower quota by 10% over 5 years). Mention if a long-term co-management agreement is envisaged, increasing industry participation in management, sustainable harvesting, economic viability, etc.

4. GENERAL MANAGEMENT OBJECTIVES

4.1 Conservation/Sustainability

Provide specific and quantifiable short-term objectives for the stock.

4.2 International Considerations

Provide specific and quantifiable short-term objectives if the fishery has an international component (fished by foreign countries or using foreign vessels).

4.3 Domestic Considerations

a) Aboriginal Fishery

Describe DFO initiative to promote native involvement in communal and commercial fisheries doing (# of licenses, traps, allocation, licensing priority, etc.). Outline any specific objectives that the plan is trying to reach.

b) Recreational Fishery

Describe the plan's specific objectives regarding the recreational fishery: # or participants, licenses, where, how much fish.

c) Commercial

Describe the plan's specific objectives regarding the commercial fishery (e.g., increasing net revenues while ensuring sustainability; equitable sharing, etc.

d) Exploratory/Experimental

Describe any exploratory/experimental fishery including # of participants, where, how, what, and reasons for doing and objectives.

5. CURRENT MANAGEMENT ISSUES

List and describe each issue that exist in this fishery (e.g., by-catch problems, conflicts between gear sectors, aboriginal issues, conservation issues, etc.

6. MANAGEMENT MEASURES FOR THE DURATION OF THE PLAN

6.1 Fishing Seasons
6.2 Control and Monitoring of Fishing Activities
6.3 Quota Allocations
6.4 Other Relevant Elements
- ***a) Licensing***
- ***b) Key Legislation***

Describe the controls (management measures) adopted for the fishery for the period of the plan. Provide details of controls such as TAC, quota allocations by fleet sector, seasons, # traps, new licences, etc. Include any special measures such as introduction of new regs, policies, sharing arrangements, monitoring tools, etc. Describe the method of allocating fish (see BC Herring Roe Plan as an example).

7. ENFORCEMENT ISSUES AND STRATEGIES FOR 1996

7.1 Overview
7.2 Main Program Activities
7.3 Fishery Patrol Vessels
7.4 Air Surveillance
7.5 Enforcement Issues and Strategies

Describe main enforcement problems in this fishery and results of previous years enforcement activities (e.g., # of boarding, # of charges laid, convictions, court decisions, etc.). Provide an

overview of the enforcement/monitoring activities that will be carried out for this fishery (e.g., pre-season checks, in-season activities such as boardings, air surveillance, night time surveillance, observers at sea, dockside monitoring program, guardians, etc.). Describe what enforcement are looking and checking for, e.g. tags, sizes, sexes, by-catch, amounts, etc. Describe platforms used, e.g., large patrol vessels, small vessels, fixed and rotary wing aircraft, specialized equipment. Describe specific issues which will be addressed for the period of the plan by priority and strategies.

8. FINANCIAL RESPONSIBILITIES

8.1 Industry
8.2 Fisheries and Oceans

Provide details activities and asociated costs related to the management of the fishery for both DFO and industry (e.g., observer coverage, DMP, logbooks, boat charters, advisory meeting, international negotiations, etc.) It may not always be possible to cost out all DFO activities. However, these activities should be at least identified and possibly quantified, such as # of hours/days/weeks of fishery officers time, # of patrols, boardings, # of air hours, etc. If a plan includes a (co-management/partnership) joint project agreement, it should be attached as an annex.

Describe what activities industry is responsible for either paying, or coordinating, or managing such as observers, dockside monitoring, hails, index fishers program, reporting requirements, data entry, scientific research, etc.

ANNEX I

Management Plan Evaluation Criteria

These should be linked to the stated general management objectives and current management issues. The criteria should provide a measure of whether the objectives/issues were met/dealt with.

ANNEX II

Conservation & Protection Plan Evaluation Criteria

These should be linked to the objectives of the enforcement plan and should include a measure of efficiency in terms of reduction in infractions or violations detected. Usually appears as a list, related to FOWERS activities.

ANNEX III

Consultative Group

Terms of Reference
Membership - provide names, unless an organization is the member.

ANNEX IV

DFO Roles and Responsibilities

Short description of the role of the different DFO sectors in the development and application of the plan.

Resource Management

- Takes the lead in bringing the various DFO sectors and elements of the management plan together to develop the management options;
- Responsible for consultations with industry and provinces;
- Responsible for managing pre, in, post-season processes.
- Responsible for drafting the plan.

Science

- Provides the stock forecast for the upcoming season;
- Indicates any conservation concerns;
- Provides advice on the appropriateness of management options to address conservation concerns;
- Specifies what, if any, data requirements they need to have to facilitate in-season adjustments and post-season evaluations.
- Advise of research projects required for proper assessment of the stock.

Aboriginal Affairs

- Ensure legal obligations or policies are covered in the plan;
- Negotiate and approve fisheries agreements with aboriginal groups;
- Other considerations that may be part of fisheries agreements, including sales projects or enforcement protocols.

Conservation and Protection

- Identifies enforcement problems to be addressed in the development of the management plan;
- Suggests specific enforcement measures to address enforcement issues.
- Develop proposed enforcement plans and carry them out.

Policy

- Responsible for making regulatory changes required in support of management plan.

International

- Provides input on international obligations or concerns;
- Lead international negotiations involving the stocks.

Communications

- Provides advice on developing appropriate communications strategies for managment plans and for developing appropriate communications material to accompany the plans (e.g. news release, backgrounders).

Departmental Contacts

Provide name, Branch/Sector, phone and fax numbers and E-mail/ Internet addresses of contacts for each DFO sector (C&P, Resource Management, Aboriginals, Science, Communications, Policy)

ANNEX IV

News Release

News release announcing the plan should be last annex. (This would result in the document being printed only after the plan is announced.)

Annex 5.

List of Working Papers Presented

98/55* Annand, C. Dockside monitoring program: a review.

98/56 Showell, M. A. Observer coverage levels on 4Vn - 5Z groundfish fisheries, 1989 - 1997.

98/57 Hurley, P. C. F., P. A. Comeau, C. Annand, D. Clark, B. Wood and L. Van Eeckhaute. The utility of at-sea surveillance samples for biological purposes.

98/58 Branton, R. A review of the Maritimes Region port sampling program for the period 1989-97.

98/59 Branton, R. A comparison of commercial groundfish length frequency samples taken in 1997 by National Sea Products Limited and Marine Fish Division.

98/x-7 Fanning, P., K. Marsh and W. MacEachern. Investigations in discarding and other fishing practices.

* Recommended by Chairman for upgrading to Research Document once contents finalized.